Complete Summary

GUIDELINE TITLE

Prevention of infections related to peripheral intravenous devices.

BIBLIOGRAPHIC SOURCE(S)

Singapore Ministry of Health. Prevention of infections related to peripheral intravenous devices. Singapore: Singapore Ministry of Health; 2002 May. 38 p. [52 references]

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Peripheral intravenous device-related infections

GUIDELINE CATEGORY

Management
Prevention

CLINICAL SPECIALTY

Nursing

INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Health Care Providers
Hospitals
Nurses

GUIDELINE OBJECTIVE(S)

- To provide a conservative interpretation of the available evidence applicable to cannula-related infections and
- To provide practical and relevant advice to the healthcare workers to minimize the risk of infection associated with intravenous devices

TARGET POPULATION

Adults receiving peripheral venous therapy in Singapore.

The guidelines may not be appropriate for the management of neonates and children on intravenous (IV) therapy. It is also not applicable when other intravascular devices such as central, arterial or haemodialysis catheters are used.

INTERVENTIONS AND PRACTICES CONSIDERED

Prevention

1. Handwashing and aseptic technique
2. Barrier precautions during peripheral venous cannula insertion and care
3. Selection of peripheral insertion site
4. Intravenous (IV) device selection and replacement (e.g., use of Teflon or polyurethane cannula or steel needles and use of routine or scheduled replacement of IV cannula)
5. Education and training of health care workers

Management

1. Maintenance
    - Cannula, cannula site, and injection port care (e.g., skin cleansing with 70% alcohol or 10% povidone-iodine; use of transparent dressing or sterile gauze; use of normal saline or diluted heparin flush solution; cleaning of injection ports with 70% alcohol)
    - Replacement of administration sets and IV fluids
    - Preparation and quality control of IV admixtures
2. Infection surveillance
    - Cannula site
    - IV device (phlebitis)

Other Interventions/Practices Considered but No or Negative Recommendations Given

1. In-line filters
2. Needleless intravascular devices
3. Prophylactic anti-microbials
4. Use of routine hydrocortisone or heparin in parenteral solutions to reduce phlebitis
5. Routine use of topical venodilators (e.g., glyceryl trinitrate or anti-inflammatory agents)

MAJOR OUTCOMES CONSIDERED

- Phlebitis rate
- Local or systemic infections
- Hospitalisation
- Infection-related morbidity and mortality

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Literature Review

This set of guidelines is adapted from the Guideline for Prevention of Intravascular Device-Related Infections by the Centers for Disease Control of the United States of America (Pearson 1996), as no new evidence was found from searches on MEDLINE, CINAHL, Cochrane library between 1995 and 2000.

Current clinical practice in Singapore was reviewed by studying the existing guidelines and documentation used by various local hospitals and institutions.

For areas where available evidence is inconsistent or inconclusive, recommendations were made based on the clinical experience and judgement of the workgroup or expert committee reports.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

For the definitions of the strength of evidence and the grades of recommendations in this guideline, the workgroup adopted the criteria used by the Scottish Intercollegiate Guidelines Network (SIGN), which originated from Agency for Healthcare Research and Quality, the former Agency for Healthcare Policy and Research.

Levels of Evidence

Ia Evidence obtained from meta-analysis of randomised controlled trials.

Ib Evidence obtained from at least one randomised controlled trial.

IIa Evidence obtained from at least one well-designed controlled study without randomisation.

IIb Evidence obtained from at least one other type of well-designed quasi-experimental study.

III Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case studies.

IV Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities.

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Grades of Recommendation

Grade A (evidence levels Ia, Ib) Requires at least one randomised controlled trial as part of the body of literature of overall good quality and consistency addressing the specific recommendation.

Grade B (evidence levels IIa, IIb, III) Requires availability of well conducted clinical studies but no randomised clinical trials on the topic of recommendation.

Grade C (evidence level IV) Requires evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities. Indicates absence of directly applicable clinical studies of good quality.

GPP (good practice points) Recommended best practice based on the clinical experience of the guideline development group.

COST ANALYSIS

The guideline developer reviewed published cost analyses.

Replacement of Administration Sets and IV Fluids

Data from three well-controlled studies show that replacing administration sets 72 hours or more after initiation of use is safe and cost-effective.

METHOD OF GUIDELINE VALIDATION

External Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

The draft guidelines were circulated to hospitals and institutions together with a structured questionnaire for review and evaluation of the recommendations in clinical practice.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Each recommendation is rated based on the levels of the evidence and the grades of recommendation. Definitions of the grades of the recommendations (A, B, C, Good Practice Points) and levels of the evidence (Level I- Level IV) are presented at the end of the Major Recommendations field.

Handwashing

B - Wash hands before and after palpating, inserting, replacing, or dressing any intravenous (IV) device. (Grade B, Level IIb)

Barrier Precautions During Cannula Insertion and Care

C - Wear non-latex or latex gloves when inserting an IV device. (Grade C, Level IV)

C - Wear non-latex or latex gloves when changing the dressings on IV devices. (Grade C, Level IV)

GPP - Use sterile or non-sterile clean gloves during change of dressings.

Selection of Peripheral Cannula Insertion Site

A - Use an upper extremity site in preference to one on a lower extremity for cannula insertion. Transfer a cannula inserted in a lower extremity site to an upper extremity site as soon as the latter is available. (Grade A, Level Ib)

Selection and Replacement of IV Devices

C - Select a device with the lowest relative risk of complications (infectious versus non-infectious) and the lowest costs for the anticipated type and duration of IV therapy. The risk and benefits of replacing a device at a recommended schedule to reduce infectious complications should be weighed against the risk of mechanical complications and availability of alternative sites. Decisions regarding

the type of device and its frequency of replacement should be determined on an individual patient basis. (Grade C, Level IV)

A - Select cannulas based on the intended purpose, duration of use, experience at the institution and known complications (e.g., phlebitis). Use a Teflon cannula, a polyurethane cannula or a steel needle. (Grade A, Level Ib)

B - Avoid the use of steel needles for the administration of fluids and medications that may cause tissue necrosis if extravasation occurs. (Grade B, Level III)

C - Remove any IV device as soon as it is no longer clinically indicated. (Grade C, Level IV)

GPP - Wear non-latex or latex gloves when removing IV cannula.

A - Replace short, peripheral venous cannulas, and rotate peripheral venous sites every 48 to 72 hours to minimise the risk of phlebitis. Remove cannulas inserted under emergency conditions, where breaks in aseptic technique are likely to have occurred. Insert a new cannula at a different site within 24 hours. (Grade A, Level Ib)

Cannula Site Care

A - Before cannula insertion, cleanse the skin site with an appropriate antiseptic, including 70% alcohol or 10% povidone-iodine. Allow the antiseptic to remain on the insertion site for an appropriate length of time before inserting the cannula. (Grade A, Level Ib)

C - Do not palpate the insertion site after the skin has been cleansed with antiseptic (this does not apply to maximum barrier precautions during which the operator is working in a sterile field). (Grade C, Level IV)

A - Use either a transparent dressing or sterile gauze to cover the cannula site. (Grade A, Level Ib)

A - Replace cannula site dressings when they become damp, loosened, or soiled, or when the device is removed or replaced. Change dressings more frequently in diaphoretic patients. (Grade A, Level Ib)

C - Avoid touch contamination of the cannula insertion site when the dressing is replaced. (Grade C, Level IV)

A - Do not routinely apply topical anti-microbial ointment to the insertion site of peripheral venous cannulas. (Grade A, Level Ib)

Cannula Care

A - Routinely flush peripheral venous locks with normal saline solution, unless they are used for obtaining blood specimens, in which case a diluted heparin (10 units per ml) flush solution should be used. (Grade A, Level Ia)

No recommendation for the routine use of topical venodilators (e.g., glyceryl trinitrate) or anti-inflammatory agents (e.g., cortisone) near the insertion site of peripheral venous cannulas to reduce phlebitis.

No recommendation for the routine use of hydrocortisone or heparin in parenteral solutions to reduce phlebitis.

Replacement of Administration Sets and IV Fluids

C - In general, administration sets include the area from the spike of tubing entering the fluid container to the hub of the vascular device. However, a short extension tube may be connected to the vascular device and may be considered a portion of the device to facilitate aseptic technique when changing administration sets. Replace extension tubing when the vascular device is replaced. (Grade C, Level IV)

A - Replace IV tubing, including piggyback tubing and stopcocks, no more frequently than at 72-hour intervals, unless clinically indicated. (Grade A, Level Ib)

No recommendation for the frequency of replacement of IV tubing used for intermittent infusions.

C - Replace tubing used to administer blood and blood products immediately after transfusion. (Grade C, Level IV)

B - Replace tubing used to administer lipid emulsions within 24 hours of initiating the infusion. (Grade B, Level III)

Intravenous Injection Ports

C - Clean injection ports with 70% alcohol before accessing the system. (Grade C, Level IV)

Preparation and Quality Control of IV Admixtures

C - Check all containers of parenteral fluid for visible turbidity, leaks, cracks, particulate matter and the manufacturer´s expiration date before use. (Grade C, Level IV)

B - Use single-dose vials for parenteral additives or medications whenever possible. (Grade B, Level III)

B - Refrigerate multi-dose vials after they are opened as recommended by the manufacturer. (Grade B, Level IIb)

B - Cleanse the rubber diaphragm of multi-dose vials with 70% alcohol before inserting a device into the vial. (Grade B, Level III)

B - Use a sterile device each time a multi-dose vial is accessed, and avoid touch contamination of the device before penetrating the rubber diaphragm. (Grade B, Level III)

B - Discard multi-dose vials, when suspected or visible contamination occurs or when the manufacturer´s stated expiration date is due. (Grade B, Level III)

In-line Filters

B - Do not use filters routinely for infection control purposes. (Grade B, Level IIa)

Needleless Intravascular Devices

No recommendation for use of needleless intravascular devices.

Prophylactic Anti-microbials

A - Do not administer anti-microbials routinely before insertion or during use of an IV device to prevent cannula colonisation or bloodstream infection. (Grade A, Level Ib)

Surveillance for Cannula-related Infection

C - Palpate the cannula insertion site daily for tenderness through the intact dressing. (Grade C, Level IV)

C - Inspect the cannula site visually if the patient has evidence of tenderness at the insertion site, fever without obvious cause, or symptoms of local or bloodstream infection. (Grade C, Level IV)

C - In patients who have large, bulky dressings that prevent palpation or direct visualisation of the cannula insertion site, remove the dressing, visually inspect the cannula site at least daily and apply a new dressing. (Grade C, Level IV)

C - Record the date and time of cannula insertion in an obvious location near the cannula-insertion site (e.g., on the dressing). (Grade C, Level IV)

B - Conduct surveillance for IV device-related infections to determine device-specific infection rates, to monitor trends in those rates, and to assist in identifying lapses in infection control practices within one´s own institution. (Grade B, Level IIa)

B - Do not routinely perform surveillance cultures of devices used for IV access. (Grade B, Level IIb)

Health Care Worker Education and Training

A - Conduct ongoing education and training of health care workers regarding procedures for the insertion and maintenance of IV devices and appropriate

infection control measures to prevent IV device-related infections. Audiovisuals can serve as a useful adjunct to educational efforts. (Grade A, Level Ib)

Definitions:

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IV Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for each recommendation (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

During the use of intravenous (IV) devices, micro-organisms may enter the blood stream and is associated with a variety of local or systemic infections resulting in prolonged hospitalisation, increased morbidity and mortality of the patients. However, the risk of infection associated with the devices can be minimised by appropriate infection prevention measures.

POTENTIAL HARMS

The risk and benefits of replacing a device at a recommended schedule to reduce infectious complications should be weighed against the risk of mechanical complications and availability of alternative sites.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- This set of guidelines aims to serve as a guide for practitioners who are involved in caring for or treating adult patients with peripheral intravenous devices. The recommendations are based on the available research findings. However, there are some aspects in which there is insufficient published research and, therefore, consensus of experts in the field has been utilised to provide guidelines specific to conventional practice.
- Every practitioner is accountable and responsible for the prevention of infection associated with peripheral intravenous devices. It is recommended that individual practitioners assess the appropriateness of the recommendations with regards to individual patient condition, overall treatment goal, resource availability, institutional policies and treatment options available before adopting any recommendation in clinical practice.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

Clinical Audit

Hospital and institution administrators should consider these guidelines in their in-house quality assurance programmes. Nurses should critically review the implications of these guidelines on their routine care, patient-teaching and educational needs.

Outcome indicators

The recommended key outcome indicator is indwelling cannula phlebitis rate.

Indwelling phlebitis rate may best be assured through audits of randomly selected individual episodes of care and a retrospective review of cases at regular intervals. Pearson (1996) recommends keeping phlebitis occurrence rate to below 5%. The phlebitis rate is calculated according to a standard formula:

[Number of phlebitis (1+ or higher) incidents / Total number of IV peripheral lines] X 100 = % Peripheral Phlebitis

Assessment tool

The degree of phlebitis shall be measured according to a uniform scale and shall be documented in the nursing record. A phlebitis scale provides a uniform standard for measuring degrees of phlebitis. The presence of pain does not constitute phlebitis. However, pain must always be evaluated to determine appropriate intervention. Pain around the cannula is usually a precursor to phlebitis that requires cannula removal and documentation in the nursing record. A phlebitis scale should be established in organisational policy and procedure. Pearson (1996) recommends the following Phlebitis Rating Scale:

Phlebitis Scale / Description

0 = No clinical symptoms

1+ = Erythema with or without pain; oedema may or may not be present; no streak formation; no palpable cord

2+ = Erythema with or without pain; oedema may or may not be present; streak formation; no palpable cord

3+ = Erythema with or without pain; oedema may or may not be present; streak formation; palpable cord

Audit

Audit is strongly recommended at ward level. It will be advantageous to establish current baseline practice against which change may be measured.

Management role

Hospital and institution administrators, together with quality assurance teams should ensure that outcome indicators are met. They may use hospital or institution that perform well as a benchmark of quality practice.

Implementation of Guidelines

It is expected that these guidelines be adopted after discussion with clinical and management staff of their respective hospitals and institutions. They may review how these guidelines may complement or be incorporated into their existing institution protocols.

Feedback may be directed to the Singapore Ministry of Health for consideration in future review.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Staying Healthy

IOM DOMAIN

Effectiveness
Safety

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

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ADAPTATION

This set of guidelines is adapted from the Guideline for Prevention of Intravascular Device-Related Infections by the Centers for Disease Control of the United States of America: Am J Infect Control 1996 Aug;24(4):262-77.

DATE RELEASED

2002 May

GUIDELINE DEVELOPER(S)

Singapore Ministry of Health - National Government Agency [Non-U.S.]

SOURCE(S) OF FUNDING

Singapore Ministry of Health (MOH)

GUIDELINE COMMITTEE

Workgroup on Prevention of Infections Related to Peripheral Intravenous Devices

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the Singapore Ministry of Health Web site.

Print copies: Available from the Singapore Ministry of Health, College of Medicine Building, Mezzanine Floor 16 College Rd, Singapore 169854.

AVAILABILITY OF COMPANION DOCUMENTS

None available

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI on May 20, 2003. The information was verified by the guideline developer on June 4, 2003.

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